STATE OF SOUTH DAKOTA

FOREST HEALTH HIGHLIGHTS 2017

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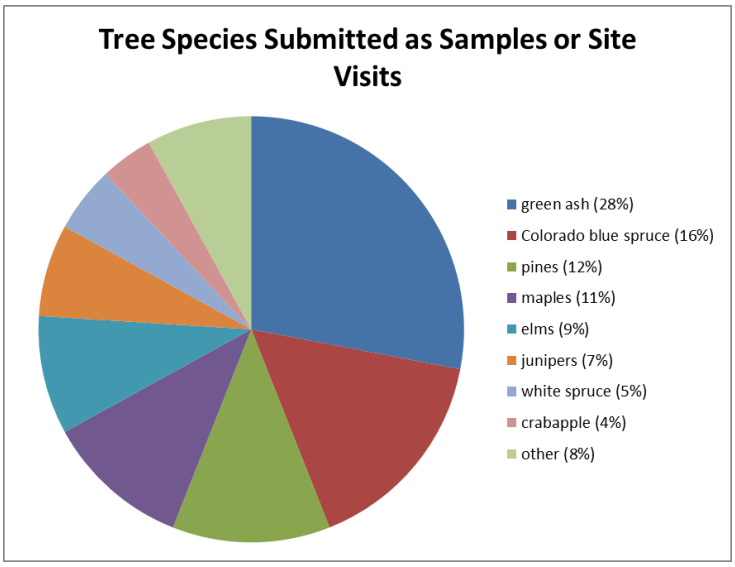
GENERAL OVERVIEW:

The most common tree species from which samples were submitted (either by mail or as pictures send by email or text) or inspected during site visits was green ash *(Fraxinus pennsylvanica)* (28%). Green ash is one of the most common trees in South Dakota community forests and windbreaks. The discovery of emerald ash borer in Welcome, Minnesota and Alta, Iowa this summer increased awareness and concern regarding the insect so more tree owners were looking for symptoms and signs of emerald ash borer infestations in their ash trees.

Green ash with ash leaf curl aphid in Rapid City, SD (Marcus Warnke, 2013)

Colorado spruce *(Picea pungens)* was the second most common tree associated with samples (16%). This is also a very common tree in communities and windbreaks. There are also many over-mature spruce and in combination with the state-wide drought this resulted in decline of this species across the state. White spruce *(P. glauca)* was also a common source for samples (5%). Other genera of trees that were seen in samples were pines *(Pinus)* (12%), maples *(Acer)* (11%), elms *(Ulmus)* (9%), juniper *(Juniperus)* (7%) and crabapple *(Malus)* (4%).



Samples Overview:

- *Insects and mites that were confirmed in samples submitted or pictures sent as email or text attachments (p.2);*
- *Diseases that were confirmed in samples submitted or by pictures sent as email or text attachments (p.2);*
- *Disorders that were initially submitted as samples (either by mail or as pictures) and investigated in follow-up site visits (p.3);*
- *Most common woody plants submitted as samples (either by mail or pictures) for identification (p.3).*

CONFIRMED INSECTS & MITES

BY SAMPLES SUBMITTED OR PHOTOS VIA EMAIL OR TEXT

- Apple maggot (*Rhagoletis pomonella*)
- Ash/lilac borer (*Podosesia syringae*)
- Ash grey blister beetle (*Epicauta fabricii*)
- Ash seed weevils (*Lignyodes bischoffi*)
- Aspen twiggall fly (*Hexomyza schineri*)
- Banded elm bark beetle (*Scolytus chevyrewi*)
- Banded ash borer (*Neoclytus caprea*)
- Black blister beetle (*Epicauta pennsylvanica*)
- Black walnut erineum (*Eriophyes caulis*)
- Bronze birch borer (*Agrilus anxius*)
- Cottony ash psyllid (*Psyllopsis disrcepans*)
- Codling moth (*Cydia pomonella*)
- Cotoneaster leaf crumpler (*Acrobasis indigenella*)
- Dogwood sawfly *(Macremphytus tarsatus)*
- Eastern tent caterpillar (*Malacosoma americanum*), the western tent caterpillar (*M. californicum*) and the forest tent caterpillar (*M. disstria*)
- Elm calligrapha (*Calligrapha scalaris*)
- Fall webworm (*Hyphantria cunea*)
- Fall cankerworm (*Alsophila pometaria*)
- Flatheaded appletree borer (*Chrysobothris femorata*)
- Hackberry nipple gall maker (*Pachypsylla celtidismamma*)
- Japanese beetle *(Popillia japonica)*
- Lecanium soft scales (*Parthenolecanium*)
- Lilac root weevil (*Otiorhynchus meridionalis*) and black vine weevil (*O. sulcatus*)
- Maple bladder gall mite (*Vasates quadripedes*)
- May beetles (*Phyllophaga*)
- Metallic wood-borer (*Buprestis confluenta*)
- Mourningcloak butterfly *(Nymphalis atiopa)*
- Pear slug (*Caliroa cerasi*)
- Pine leaf adelgid *(Pineus pinifoliae)*
- Plum curculio (*Conotrachelus nenuphar*)
- Spotted wing drosophila (*Drosophila suzukii*)
- Spruce needleminer (*Endothenia albolineana*)
- Willow gall midge (*Rhabdophaga strobiloides*)
- Willow sawfly (*Nematus ventralis*)
- Woolly aphids, both the woolly apple aphid (*Eriosoma lanigerum*) and the woolly elm aphid (*E. americanum*)

CONFIRMED DISEASES

BY SAMPLES SUBMITTED OR PHOTOS VIA EMAIL OR TEXT

- Apple scab (*Venturia inaequalis*)
- Ash rust (*Puccinia sparganioides*)
- Bacterial blight of lilac (*Pseudomonas syringae* pv. *syringae*)
- Black knot (*Apiosporina morbosa*)
- Buckeye rust (*Puccinia andropogonis*)
- Bur oak blight (*Tubakia iowensisi*)
- Cedar-apple rust (*Gymnosporangium juniperivirginianae*), cedar-hawthorn rust (*G. globosum*), and cedar-quince rust (*G. clavipes*)
- Cereal rust fungus (*Puccinia coronata*)
- Diplodia tip blight (*Diplodia pinea*)
- Dutch elm disease (*Ophiostoma novo-ulmi*)
- Fireblight (*Erwinia amylovora*)
- Juniper broom rust (*Gymnosporangium nidus-avis*)
- Kabatina twig blight (*Kabatina juniperi*)
- Marssonina blight (*Marssonina populi*)
- Peach leaf curl (*Taphrina deformans*)
- Phomopsis twig blight (*Phomopsis juniperovora*)
- Plum pockets (*Taphrina communis*)
- Tar spot (*Rhytisma acerinum*)
- Spruce needlecast, (*Stigmina lautii* and *Rhizosphaera kalkhoffii*)
- Walnut anthracnose (*Ophignomonia leptostyla*)
- Verticillium wilt (*Verticillium dahliae*)

Sample photos submitted, with follow-up site visits

- Chlorosis (*Acer rubrum, Betula nigra* and *Quercus palustris*)
- Drought *(Juniperus, Picea)*
- Improper planting (numerous species)
- Winter- burn (*Abies, Taxus* and *Thuja*)

Chlorosis on river birch (Dr. Ball, Pest Update June 14, 2017 Vol. 15, No. 18)

Woody Plant identification requests

- Common chokecherry *(Prunus virginiana)*
- Common buckthorn (*Rhamnus cathartica*)
- Green ash *(Fraxinus pennsylvanica)*
- Tamarisk (*Tamarix ramosissima*)
- Tatarian honeysuckle (*Lonicera tatarica*)

Highlighted Insect Conditions

Cedar bark beetles *(Phloeosinus spp.)*

These bark beetles are secondary insects that hasten the decline of junipers that are already stressed. The predisposing stress for this outbreak is the current severe drought. The combination of the drought and colonization by this insect has resulted in the loss of juniper (cedar) windbreaks in the south central part of the state. This past spring and summer there were numerous reports of declining windbreaks of eastern redcedar (*Juniperus virginiana*). There were few reports of the insect in windbreaks of Rocky Mountain juniper (*J. scopulorum*) though this species is more drought-tolerant.

HIGHLIGHTED INSECT CONDITIONS (CONTINUED)

Emerald ash borer *(Agrilus planipennis)*

Emerald ash borer has not yet been found in South Dakota but detection trapping in parks and campgrounds continues throughout the state. The Agrilus caught in the traps to-date is the bronze birch borer *(A. anxius)* or the willow borer *(A. politus)*. Pest Detector workshops were held during the summer and 53 people, mostly Master Gardeners, were trained in the detection of this pest as well as thousand cankers disease. Master Gardeners reported, and were followed up, 83 reports of possible emerald ash borer infestations. All reports from ash trees suspected to be infested with emerald ash borer were colonized by either redhead *(Neoclytus acuminatus)* or banded ash borer *(N. caprea).* These insects are common in recently killed or dying ash and the current drought has left trees vulnerable to successful attack. The only adult insects submitted as possible emerald ash borers were the golden buprestid *(Buprestis aurulenta)*.

The discovery of emerald ash borer in Welcome, Minnesota and Alta, Iowa, both communities within 80 miles of the South Dakota border, has increased concern among tree owners about losing their trees. There are several tree care companies in Sioux Falls, 130 miles from the nearest infestations, taking advantage of this fear by selling injections for emerald ash borer. The South Dakota Department of Agriculture and the South Dakota Cooperative Extension does not recommend treating ash until it has been confirmed within 15 miles of their tree. This threshold for treatment was publicized in press releases to area newspapers and radio stations.

Gall adelgid (*Agelges and Pineus)*

There has been an outbreak of these insects in the northern Hills of the Black Hills. There have been numerous white spruce *(Picea glauca)*, usually between 6 and 20 feet tall, infested by the pine leaf adelgids *(Pineus pinifoliate)*. The galls created by this insect are less noticeable and smaller than the pineapple-shaped galls form by the coolly *(Adelges cooleyi)* and eastern *(A. abietis),* two other common insects of spruce in South Dakota. The galls of the pine leaf adelgids are much looser and appear more as distorted needles which are sometimes confused with herbicide application.

Spruce gall adelgid damage on Black Hills spruce (Marcus Warnke, 2017)

Gypsy moth *(Lymantria dispar)*

While South Dakota does not have established population of gypsy moth, traps placed throughout the state may capture an adult or two. This year, as with many past years, the capture was limited to a few traps in the Black Hills and Minnehaha County, the two locations that receive most of the summer out-of-state visitors.

Japanese beetle *(Popilia japonica)*

The southern half of the state is experiencing increasing tree defoliation from this introduced insect. There were no report of defoliation by this insect as recently as six years ago and now it is established in numerous communities along or south of the I-90 corridor. The most common trees experiencing defoliation are the lindens *(Tilia).* In some communities many of these trees were almost completely defoliated by the beginning of August. An out-of-state shipment of nursery stock was sent to the state in mid-summer, 2017, that contained Japanese beetle larvae and a follow up inspection was made to the garden centers in which this stock was delivered.

Japanese beetle damage on a linden (Dr. Ball Pest Update Aug. 9, 2017, Vol. 15, No. 26)

Highlighted Insect Conditions (continued)

Mountain pine beetle *(Dendroctonus ponderosae)*

The mountain pine beetle epidemic which began in 1997 is over. The mortality peaked in 2011-2012 and declined dramatically after that. Pine mortality from mountain pine beetle is less than 0.5 trees per acre over the Black Hills. There is still some significant pine mortality in the southern Black Hills, however even there the groupings of infested trees are less than 50 with most attacks limited to single trees. These trees are usually smaller diameter trees (less than 8 inches dbh). Any larger trees that were attacked were either strip attacks or lightning struck.

While there were still a few tree care companies offering preventative spraying this past spring, the number of companies offering this service, and the landowners purchasing this service has declined. Fewer landowners are managing their stands for mountain pine beetle as the need for sanitation harvests is less as any infestations on their land is generally only a few isolated trees, rather than pockets of mature trees.

However, there is the need to begin managing the next epidemic. The areas of the Black Hills that were severely impacted by mountain pine beetle are now covered with regeneration with a seeding and sapling density of 30,000 trees or more per acre. Forest landowners need to focus on thinning these stands as well as promoting diversity through encouraging aspen regeneration as well as paper birch and bur oak.

Aerial view of Black Elk Peak looking east into the Black Elk Wilderness. Most mature pine have been killed by MPB, and the remaining green trees are Black Hills spruce and immature ponderosa pine. (Marcus Warnke, 2016).

Pine engraver beetles (*Ips spp.*)

Pine engraver beetle populations were very low during the past year but we have seen an increase in attacks on live trees in some stands. These localized population increases may be due to chipping slash following thinning operations. We have seen an increase in pine mortality in stands where the fresh slash has been chipped in early spring.

Red turpentine beetle *(Dendroctonus valens)*

Populations of red turpentine beetle have also appeared to increase recently. The number of infested trees is still relatively low and is limited to either new housing developments in the Black Hills which has left damaged trees or trees stressed by drought.

Spruce needleminer *(Endothenia albolineana)*

There have been increased reports of the needleminer infesting Colorado spruce *(Picea pungens)* in windbreak and communities in the eastern half of the state. This insect can cause severe defoliation in heavily infested trees, and in combination with drought injury, can result in tree mortality. During 2017 reports of dead or dying Colorado spruce, between 10 and 30 years old were common and while drought was the predisposing stress, the needleminer may have played an important role as an inciting factor in the mortality.

HIGHLIGHTED INSECT CONDITIONS (CONTINUED)

Striped pine scale *(Toumeyella pini)*

Pine tortoise scale *(T parvicornis)* has been an occasional problem on sapling pines and shrub-form mugo pines in the eastern half of the state. This year there have been a number of reports of severe infestations of the striped pine scale, a closely related species, on mature ponderosa pines in the Black Hills. The majority of these stands had been sprayed for mountain pine beetles for the past four or five years and this treatment may have reduced the natural enemies of this insect.

Striped pine scale on ponderosa pine from Black Hills (David Ahrens: SDDA Intern, 2017)

Zimmerman pine moths *(Dioryctria spp)*

Zimmerman pine moth continues to be a problem in Austrian and ponderosa pine *(P. ponderosa)* windbreaks and communities in South Dakota. Austrian pine is the primary species affected, though ponderosa pine windbreaks are also experiencing significant branch breakage. The loss of terminals has left many infested trees with distorted trunks.

HIGHLIGHTED DISEASE CONDITIONS

Bur oak blight *(Tubakia iowensisi)*

This disease was first noticed on bur oaks in southern Minnesota, Iowa and eastern Nebraska back in the 1990s where it became associated with declining bur oak *(Quercus macrocarpa)*. It has been reported in most of the South Dakota counties bordering Minnesota and Iowa. The disease is more prevalent on the bur oak botanical variety *Q. macrocarpa var. oliviformis* which is more common to dry, upland sites. This variety produces slightly smaller acorns than most other bur oaks. This botanical variety is found along woody draws and rolling hills of eastern South Dakota and includes the draws that are incorporated into Sioux Falls. There are many landowners in this community that are treating their oaks.

Bur oak near Dakota Dunes, SD with bur oak blight (Dr. Ball Pest Update, July 5, 2017, Vol. 15, No. 21)

Diplodia tip blight on ponderosa pine (Dr. John Ball, Pest Update July 29, 2015, Vol. 13 No. 23)

Diplodia tip blight *[Diplodia pinea (Sphaeropsis pinea)]*

The disease was commonly reported throughout the state on Austrian and ponderosa pines in shelterbelts and in communities. While the disease has been present in these declining trees, the underlying problem appears to be that the trees are over-mature and stressed by the present drought.

Highlighted Disease Conditions (continued)

Dutch elm disease *(Ophistoma novi-ulmi)*

Reports of the disease were widespread in eastern South Dakota during 2017 but the losses were relatively low. Communities with a significant elm population, more than 10% of their street tree population, had losses of less than 4% of its remaining American elms to Dutch elm disease. However, within every South Dakota community American elm populations have continued to decline due to disease (Dutch elm disease and veticillium wilt), storms and construction. While American elm is still one of the most common community trees in the state, comprising more than 5% of the total street tree population, this is a drop from more than 10% two decades ago. There are some new street plantings of Princeton elm *(Ulmus americana 'Princeton')*, but most of the elms being planted are Accolade *(U. x 'Morton')*, Discovery *(U. davidiana var. japonica 'Discovery')* and Triumph *(U. x 'Morton Glossy')*.

Pine wilt nematode *(Bursaphelenchus xylophilus)*

Rapidly declining Scotch pine *(Pinus sylvestris)* in the southern region of the state have been found infected by this nematode. Reports of the disease increased in 2017 mostly on Scotch pine though some Austrian pines *(P. nigra)* were infected as well as a few mugo pines *(P. mugo)*. While the disease was confined to the southern one-third of the state 20 years ago, the disease is now common throughout the southern half of the state and pine wilt has been found killing Scotch pines even north of this line. The disease is killing Scotch pines throughout Sioux Falls, our largest community, though there are tree care companies offering treatments and some tree owners are taking advantage of this option to protect their mature trees.

White pine blister rust on limber pine in Custer State Park. (Dr. John Ball, 2016)

White pine blister rust *(Cronartium ribicola)*

This disease was discovered in the relic stands of limber pine in the Cathedral Spires area of Custer State Park in the early 2000s. A survey of the limber pines in the Park revealed only one new infection in 2017. Pruning of infected lower branches (lower 9 feet of the tree) and excising trunk cankers has been performed each summer and has reduced the severity of the disease on the population. Most of the limber pines are less than 9 inches dbh and 20 feet tall. Trees that are 9 inches dbh are approximately 120 to 130 years old. We are considering an eradication program for the currants in the draw that serve as the disease's alternate host on this isolated population.

Forest Health Conditions with Other Damaging Agents

Drought

Almost the entire state was in a moderate or severe drought in 2017. Precipitation in September has reduced or eliminated the drought in much of the state. However, during the spring and summer the drought was a significant stress to trees throughout the state. The drought has had a significant impact on this spring's windbreak plantings where losses of conifers have been in the 60 to 100% in a planting. The losses to deciduous trees have been much less. Relatively few producers were willing or able to water their newly planted stock.

Herbicide

There have been numerous reports of herbicide injury to windbreak trees and shrubs adjacent to soybean fields. The typical symptoms were leaf cupping, curling and abnormal elongation of the leaf. The foliage analysis of these plants showed a dicamba concentration of 6 to 70 ppb.

Annual Insect & Disease Training

The Division of Resource Conservation & Forestry's strategic plan requires one insect and disease training be held annually for division personnel to improve diagnoses of common problems of trees in South Dakota. These trainings are also open to other agencies and individuals looking to expand their knowledge of tree insect and diseases. This year's training was held in Rapid City on July 25th & 26th, 2017. The training was attended by all field foresters for the division, staff, forestry interns, the northwest area forester, and three members of Rapid City's urban forestry crew. Dr. Ball presented on the most common insect, disease, and other damaging agents of trees.

The second day of the training included a field portion walking around and identifying problems on trees located on the South Dakota School of Mines and Technology campus. The training received positive feedback from all in attendance.

Dr. Ball discusses chlorosis on a maple during an insect and disease training field trip (Brian Garbisch, 2017)

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